

Antenna Design Using Characteristic Modes and Related Techniques.

Comment on the presentation, “Compact Multi-element antenna for Massive MIMO based on Characteristic Modes,” by Dirk Manteuffel in EuCAP’16 Special Session on *Theory and Application of Characteristic Modes*, convened on Monday, April 11, 2016

In this paper the author first derives the Characteristic Modes (CMs) for a square-shaped plate, and then goes on to discuss the question of ‘how to’ excite these modes. In a classic paper [1] on CM, Newman has addressed the issue of excitation of the CMs, and has recommended using a source located at the maximum of the modal distribution in order to efficiently excite the mode.

However, the approach presented in this paper appears to be based on a totally different strategy, which involves cutting eight (8) long slots in the plate, and then exciting these slots with voltage sources. We have several questions for the author, and they are:

1. Did the author follow the Newman approach first, and did he find that it failed to do the job? (We have found that the Newman approach only appears to work for very simple geometries, and it often fails for complex platforms.)
2. How did the author know where to cut the slots, how long to make them, how many slots to choose, what should their shapes be, and where to excite them?
3. Once we have introduced the slots in the original square plate, we have changed the geometry. Should we not go back and find the modes of the slotted plate instead of the square plate? Did the author do that, and if so what did he find?
4. What procedure should we follow if the geometry of the platform is different, and it is not a simple square plate as it typically is?
5. Also, in many situations we are not at liberty to cut slots in the original platform. What should we do then to excite the CMs?

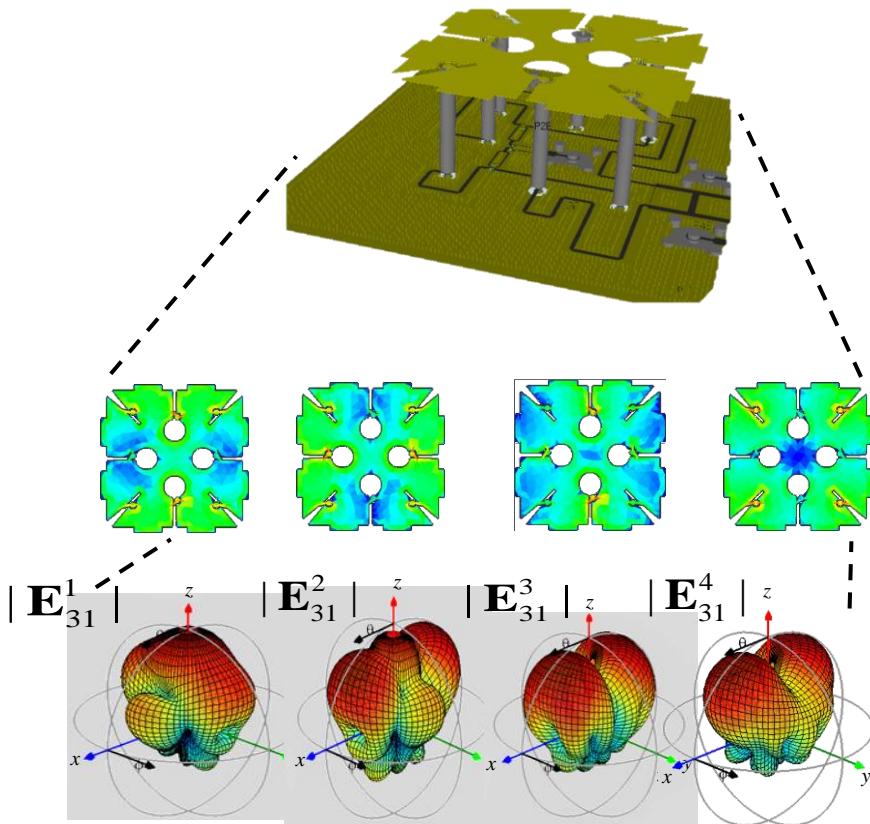


Figure No. 3.1

It would be helpful to us if the author would respond to these questions and provide us insights for addressing the issue of excitation of characteristic modes, since no systematic approach is available at present for accomplishing this task, except for the one suggested by Newman which often fails to work. (If there is a recommended approach that has a sound theoretical basis, it would be good to know. Readers please weigh in with your comments and offer suggestions.)

Submitted by: An interested participant in the CM interest group recently formed by Vincent Lau of Lund University.

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